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AN APPROACH TO PRODUCTIVITY IMPROVEMENT IN THE
PUBLIC SECTOR
A PROCEDURAL MANUAL

NASSAU COUNTY MULTI-MUNICIPAL
PRODUCTIVITY PROJECT

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JULY 1975

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"AN APPROACH TO PRODUCTIVITY
IMPROVEMENT IN THE PUBLIC SECTOR:
A PROCEDURAL MANUAL"

Prepared By The

MULTI-MUNICIPAL PRODUCTIVITY PROJECT

Of

Nassau County
Town Of Hempstead
Town Of North Hempstead
Town Of Oyster Bay
and
The Civil Service Employees Association

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FOREWORD

All material included in this Manual was developed by the Multi-Municipal Productivity Project as a result of its efforts over the past three years.

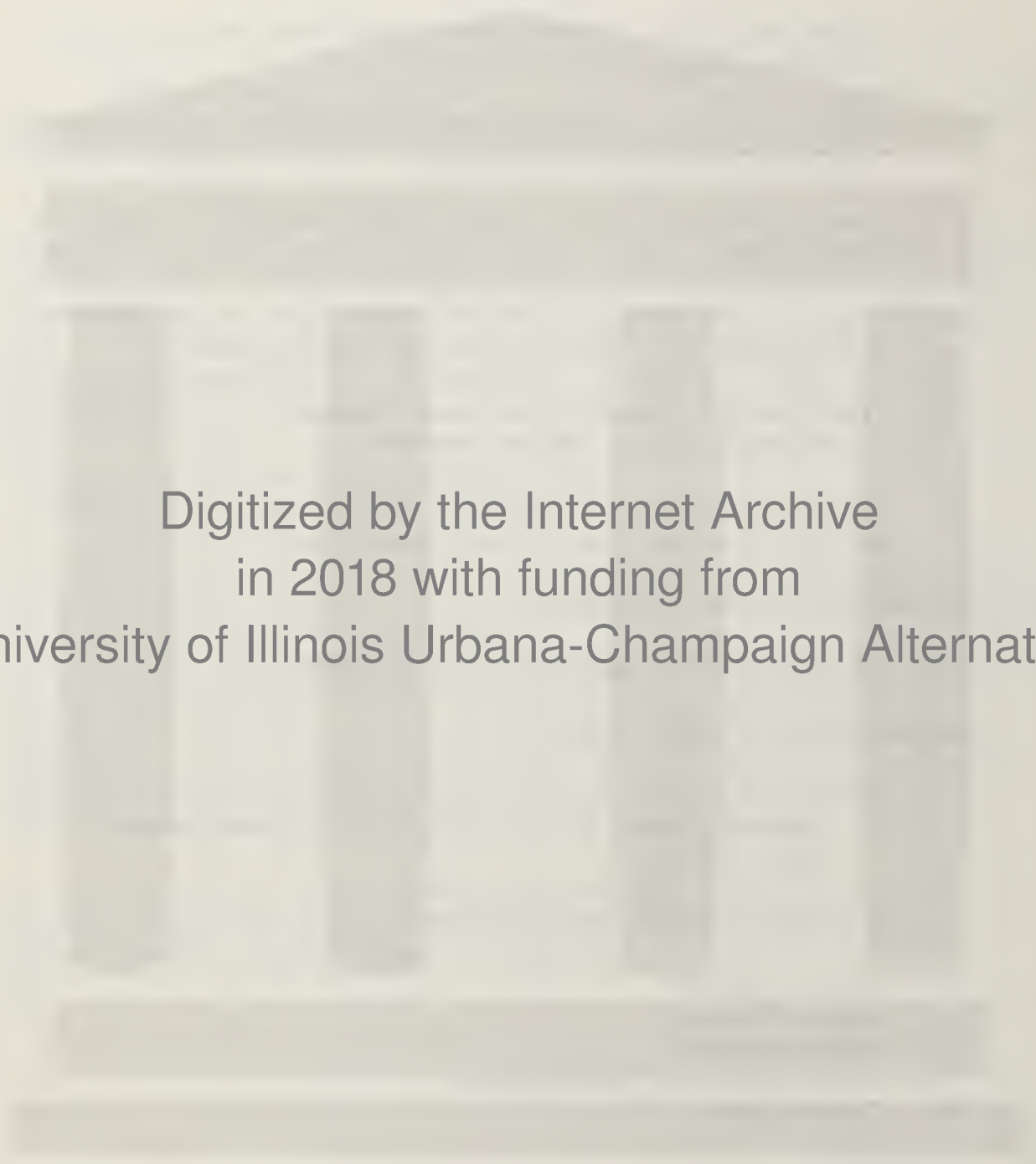
The Multi-Municipal Productivity Project was conducted by four municipalities; Nassau County, the Towns of Hempstead, North Hempstead and Oyster Bay, and the Civil Service Employees Association Union. The Project was funded by the U.S. Department of Labor and the National Commission on Productivity and Work Quality under whose contract this Manual was produced, the New York State State Department, Division of Community Affairs, and The Ford Foundation.

The major premise of our approach to productivity improvement has been that municipal services can best be improved through systems analysis, not through individual performance evaluation. Each of the steps described in the Manual has been executed by the Project. It is our feeling that each step is important for a successful productivity improvement program. However, realizing that each municipality has unique features, certain local adaptations of the outlined procedures will be required.

It is our hope that this Manual will prove useful to you, and we wish you the best of luck in your productivity improvement endeavor.

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I. WHY PRODUCTIVITY IMPROVEMENT?

The purpose of initiating productivity improvement in the public sector is to assist governments in responding to the growing demand for increased services, while maintaining the quality of service to the public at a reasonable cost. It has been found that improved productivity can be achieved through the development and application of more effective work methods, and that improvements can be implemented and measured for almost all services provided by a municipality.

Productivity improvement is related to the stabilization of the growth rate of municipal service costs. Productivity improvement programs represent a break from the past, when governments generally responded to increased demands for service by hiring more employees. It signifies an alternate approach to meeting service demand by introducing the concepts of middle-range planning, self-evaluation and analysis of work methods. In addition, productivity introduces an element of accountability into government and provides the taxpayer with an objective service evaluation mechanism.

Documented productivity achievement in the public sector allows governments to draw upon the experience of others, and enhances the impact of achievement breakthroughs from one municipality to another throughout the country. Finally, productivity improvement savings can be used in labor-management negotiations in the public sector, by linking wage increases to increases in productivity through productivity bargaining.

II. BASIC ASSUMPTIONS

A. Productivity Improvement Must Have the Support of Elected Public and Union Officials

Productivity can be a threatening idea not only to unions, but also to management. Whereas the union can view productivity improvement as a threat because of its alleged possible results--speedups or reductions in the work force--management can view the threat in the process itself--criticism of current methods of operation. Therefore, a productivity improvement program requires the strong support of both the top elected officials and union leaders. A program under the direct auspices of the chief elected official has ipso facto received top management support and will have more power to implement its recommendations. Union support of the program facilitates essential employee cooperation.

If the union has agreed to serve as a co-partner in the program, a joint Labor-Management Policy Team (LMPT) should be established to set policy and monitor program activities. The functions of this council should be clearly defined. Some suggestions for council activities are:

1. establish productivity improvement goals
2. aid in the selection of productivity targets
3. develop a communication system within the municipality
4. develop an approach to productivity bargaining

The establishment of a formal labor-management team strengthens the commitment of both labor and management. The union will have a vested interest in the achievement of productivity improvement as a means of obtaining a better bargaining position for the workers they represent. Management will be committed to a joint and participatory arrangement in its efforts to improve productivity and effect savings.

B. Productivity Improvement Can Best Be Achieved Through Employee Participation

Employee participation is based upon the concept that those who perform the service are in a unique position both to contribute to an evaluation of the service delivery system, and to suggest practical ways to improve it. Employee involvement reduces worker resistance to change by making the worker an integral part of the change process. This factor is extremely important within the public sector because it is a labor intensive service industry. Employees have the ability to either make change successful, or to undermine programs which they feel are not in their best interest.

The active involvement of employees in the change process usually provides them with a greater sense of motivation and pride in their work. This is important in maintaining the quality of municipal service. In addition, the anticipated culmination of the program in a productivity bargain, or a sharing of productivity savings directly with the work force, serves as an added incentive for employee participation.

A popular misconception exists that unions categorically oppose productivity programs. While unions are protective of gains achieved at the negotiating table, few union leaders oppose all efforts to improve

productivity. In fact, the notion of correlating part of the contract settlement to productivity gains is becoming an increasingly accepted bargaining topic. Through productivity bargaining, workers can receive a financial reward or other incentive for the achievement of improved services.

There are also other benefits for the work force which can be derived from a productivity program, the most important of which is a guarantee of continued employment. In general, a quid pro quo for union participation in any productivity program involves a guarantee that no employee will be laid off as a result of productivity improvement. Instead, it is generally agreed that any reduction in the work force will be achieved through normal attrition and the redeployment and retraining of employees.

C. A Productivity Improvement Program Requires a Staff of Trained Analysts

A successful productivity improvement program requires a full-time staff of trained systems analysts. However, the ability to analyze a municipal service unit requires more than just a knowledge of systems analysis techniques. A productivity analyst must have the ability to relate to both labor and management within an agency, in order to inspire trust and foster cooperation. The analyst must have leadership qualities and skill as a negotiator, in case the suggested productivity improvement runs counter to the desires of either labor or management, and a compromise must be arranged. Finally, the analyst must be prepared to handle any problem which might arise during the course of a productivity improvement endeavor. The analyst is a "change agent", who must possess the ability to both analyze an operation and to develop and implement new methods or procedures, with the cooperation of both labor and management.

D. The Productivity of Municipal Services Can Be Measured

Measurement in the public sector must extend beyond the traditional productivity measures used in the private sector. In private industry, an index of total output per unit of input reveals unit cost, which serves as a qualified measure of productivity. In addition, the private sector uses quality control as a check upon the quantitative output of its product. Of course, the profit and loss statement of any private firm is a typical "bottom line" productivity indicator. Rarely does government possess quality control mechanisms by which to evaluate its services. However, controls do exist in certain services such as public assistance, where an ineligibility ratio alerts management to its error rate in the approval of financial aid. For the most part, the public sector is forced to rely upon the development and use of a multiplicity of measurements, which reflect both the quality and quantity of services.

An example of where multiple measurements can be employed is a motor vehicle repair shop responsible for servicing sanitation vehicles. The general mission of the unit is to maintain a working fleet of trucks for the Sanitation Department. A sub-goal is to prevent the constant breakdown of vehicles. The following is a list of possible measurements for the repair shop:

1. downtime - the amount of time a vehicle is out of service;
2. deadtime (redline) - an extended length of time, over and above normal downtime, during which a vehicle is out of service;
3. frequency of repair - the percentage of time that the same vehicles are out of service within a given time period.

The downtime measurement serves as a check upon the repair system of the shop, particularly its ability to schedule and repair properly. Deadtime is a measure of the effectiveness of both the repair program and the inventory control system, in assuring that parts are ordered on a proper schedule to prevent delays in maintenance. The frequency of repair measure is indicative of the quality of the preventive maintenance program. This measure can also determine whether certain drivers have a consistent pattern of breakdowns on their assigned vehicles.

The challenge in the public sector is to develop measurements which reflect both the quality and quantity of service. The measure must also reflect the goals of the unit, as they are stated by management and as they are revealed through an analysis of unit operations.

E. The Importance of Objective Data on Employee Attitudes for Productivity Improvement

The expressed needs and desires of municipal employees, their relative degree of satisfaction with the work and the work environment, as well as their opinions and suggestions on work-related matters, are essential not only for their descriptive value, but also as the empirical foundation upon which to build policies for productivity improvement.

Objective information from the work force about the work force can be obtained through scientific surveys. It is possible to obtain a demographic "profile" of the work force, which in most cases will embrace all possible occupations and a wide spectrum of age, salary, and educational levels. These demographic variables can be analyzed for their relationship to important attitudinal variables, such as satisfaction with various aspects of one's job, alienation, incentive preferences, and perceived characteristics of the employee's experiences during his working hours.

Some of the practical applications of survey findings include:

- a. In many areas of government, demographic data is either unavailable or difficult to retrieve from existing records. A properly stratified random sample survey--or in the case of small

populations, a total population survey--will provide vital information about such variables as age, sex, education, tenure, salary, etc. which will prove useful for future planning, hiring policies, retirement projections, and fiscal forecasts.

- b. Identification of obstacles to productivity improvement
- c. Identification of intra-organizational problems in communication
- d. Possibility of taking into consideration the expressed needs and preferences of the employees when designing systems changes
- e. Application of survey findings to labor relations: obtaining reliable information about the employees' expressed desires makes it possible to put on the bargaining table those rewards and incentives which the employees themselves regard as most valuable, thus increasing the chance of ratification of a union contract.

F. The Public Should Be Made Aware of the Benefits of Productivity Improvement

It is important to acquaint the taxpayers with the short and long-term objectives of a productivity program. If the taxpayer is aware of how productivity improvement will work to stabilize costs and taxes, he will be encouraged to support the program. In addition, the taxpayer should be made to realize that productivity improvement means receiving more and better services for his tax dollars.

G. Communication of Program Goals and Objectives to All Participants Is Essential

It is essential to transmit information about the productivity program to all concerned parties: the taxpayers, management, and the employees. To implement a successful program, each group should be informed of its role in effectuating change, as well as the expected outcomes of the changes.

III. ORGANIZATIONAL STRUCUTRE

The productivity program should be organized directly under the chief elected official. The director of the program should report the program's activities only to the elected official and the Labor-Management Policy Team (LMPT). In this way, the program will have the support necessary to implement its recommendations. It is also important to select a program director who is familiar with the municipality's organizational structure and who is acquainted with top management and union leaders. This will facilitate the establishment of the labor-management team as well as provide easy access into departments during the initial (micro) stage of the program.

The program staff should reflect a variety of academic disciplines such as: Industrial Engineering, Law, Public Administration, Economics and Statistics. In addition, it is advantageous for staff members to possess good analytical and writing skills, a knowledge of statistical methods, and the ability to deal with other people. All of these skills are important for productivity analysts.

Staff size is dependent upon the size of the municipality and the number of productivity improvement efforts (PIEs) which will be undertaken. It is recommended that one staff analyst be hired for every 200-500 employees. During the micro stage two full-time analysts should be assigned to each individual PIE for a period of four to

six months. After this time, one analyst can assume primary responsibility for monitoring the PIE on a part-time basis.

The two analysts assigned to a PIE should have a complementary match of both technical and interpersonal strengths. When the macro stage begins, each productivity analyst will be able to monitor a larger number of departmental PIEs.

In addition to the analytical staff, hiring a full-time Communications Coordinator is recommended. The Communications Coordinator should be responsible for handling internal communications between the program and the work force, as well as communications with other jurisdictions, including research into other governmental productivity improvement programs. It is important to keep abreast of developments in other areas of the country, so that reliable methods can be adopted and duplications of effort avoided.

If a Labor-Management Policy Team is established to assist the director in determining program objectives and goals, each team member should exhibit strong commitment to the program. The team members should be in a position to assist the director in program development and be directly involved in the collective bargaining process. Possible management representatives would be the Chief Fiscal Officer, the Personnel Director, and

the Planning Director for the jurisdiction. The Labor-Management Policy Team should meet at regular intervals with the director and staff.

It is advisable that outside professionals be employed as consultants for certain aspects of a productivity program. Areas that benefit from the use of consultants include the attitudinal survey, development of initial productivity measurements, training, and productivity bargaining. Consultants for short-term use are less expensive than full-time staff. They can bring to a productivity program the benefits of their experience and can be used to train program personnel in new techniques.

7. THE PRODUCTIVITY IMPROVEMENT PROGRAM

The productivity program described within this manual consists of four major stages: (1) attitudinal survey, (2) micro stage, (3) macro stage, and (4) productivity bargaining.

The attitudinal survey should precede the other stages, to provide an objective view of worker attitudes before the productivity staff has directly intervened in any department.

The micro stage represents the undertaking of a few select productivity improvement efforts (PIEs), so as to gain acceptance and support for the program from top and middle management, as well as from the work force. The micro stage should be used to establish a pattern for future successes, to test the program's methodology, and to give the staff experience in productivity improvement. It also serves as a training period for the staff, during which time they can develop a "team" approach.

Once the micro stage has proved successful, the methodology can be applied to all departments within the municipality. The macro stage represents the institutionalization of productivity improvement within the municipality, and within all major departments and operations.

Productivity bargaining is the method used to arrive at a shared savings plan between management and labor for productivity improvements. In a situation

where one union represents most of the municipal employees and bargains for them as a whole, the gains will generally be shared by everyone within the bargaining unit on an equal basis. In this case, the municipality will need to implement productivity improvements on a broad scale in order to achieve substantial savings which can be shared with the work force.

V. IMPLEMENTING THE PROGRAM

A. Survey Stage

The attitudinal survey should focus on the following areas: analyses of attitudes of the labor force and assessment of changes in attitudes as the productivity program moves through the analytical, implementation, and evaluation stages; and supplying information to the staff which will be used when implementing productivity changes.

The attitudinal stage seeks to accomplish two major objectives:

The measurement and analysis of employees' attitudes and job-related perceptions

Communicate to the work force and general public the aims of the productivity program and its methodology

1. Measurement and Analysis of Employee Attitudes

Objective number one is designed to be conducted in three steps:

General survey of the entire work force by means of random sampling

Total population surveys in small result units or PIEs

Survey of management and labor leaders by means of interviews

a. General Survey

The purpose of the general survey is to gather and organize a body of information which is vital to the productivity program. The survey provides a full description

of work-related attitudes and their relationship to important demographic variables. Random sampling is the technique used to obtain a manageable sample which will be representative of the work force (population) under study.

(1) Sampling Procedures

One of the most important considerations in planning a survey is the number of cases to include in the sample, since the size of the sample is a major factor in estimating the cost. It is impossible to outline, except in an elementary fashion, the basic principles of scientific sampling, its theory and practical applications. Many excellent books on the subject are available, as well as general statistics texts aimed primarily toward statisticians. (See appended Bibliography.)

For the purpose of this manual, it is sufficient to outline only the basic steps of sampling, to provide for possible adaption of the methodology to similar endeavors in other communities.

It is recommended that Stratified Random Sampling be used instead of a simple random technique. Stratifying the population in terms of logical, meaningful categories makes it possible

to achieve maximum precision in the most economical way, i.e., few cases are required while insuring a more representative sample. Stratified sampling involves: (1) subdividing the total population into strata, (2) selecting a random sample from each stratum.

Salary levels and functional departments are important variables for most municipalities. The stratification of the entire work force along the two dimensions of salary level and department insures equal probability of representation of employees at all pay levels and a certain number of different functional (departmental) categories. This method requires a complete listing of all employees. The list is then separated into the categories or strata, thus resulting in as many lists as there are sub-categories. There are N_i elements in each stratum and the sum of all N_i 's is the total population. Each element in each stratum is assigned a number, and the random selection is made within each stratum by use of a table of random numbers. Successive numbers of the appropriate size are read from the table until the required sample size is attained.

(2) Estimation of Required Sample Size

Plans for most phases of the survey will be affected by the size of the sample. It is therefore essential to make a decision on sample size early in the planning stage. In order to make that decision, the surveyor must have an idea of the outcome of the returns. Such information can be gained from a pilot study, or pretest. If the results are to be given in percentages, the pretest will reveal the most essential percentage (or other statistics such as the mean) which the sample is likely to yield. The initial steps are:

- (a) Make a preliminary estimate of the most prevalent percentage
- (b) Plan to draw a large enough sample to take care of important subclasses (strata)
- (c) Decide on the permissible error and degree of certainty (see below)
- (d) Calculate the necessary sample size

It is known from probability theory, that the expected or average value to a proportion in repeated sampling is equal of the actual proportion existing in the overall population from which the sample has been drawn. This average value of the proportion will vary from sample to sample, and the amount of this variability, called the "variance", can be calculated from the pretest data.

Before proceeding with the calculation, one must specify the requisite precision desired for an analysis of results. This decision depends on two factors: (1) how much of an error in the estimate to be derived from the sample would be permissible, (2) how much assurance is required that the estimate will fall within the permissible error. The first factor is a measure of the variation in estimates which could be expected in random sampling, and is given by calculating the standard error, which is itself calculated from the variance. The second factor, a determination of the permissible error, is a matter of deciding what degree of assurance - or probability - of staying within certain tolerance limits will be sufficient for the purposes of the survey. Of the several levels of assurance suitable for statistical purposes, we chose the significance of 95%. This level is such that there are about 19 chances out of 20 (a probability of 95%) that the given sample will not be off more than about twice the standard error. Therefore, a random sample must be drawn with a standard error

which is about one-half as large as the tolerance. The degree of assurance depends upon the ratio of the tolerance to the standard error. The formula for calculating the standard error of a percentage is:

$$\sigma_{p.c.} = \sqrt{\frac{p.c. (100 - p.c.)}{n}}$$

In the above formula, p.c. stand for percentage, n for size of sample, and $\sigma_{p.c.}$ for standard error of the percentage.

For purposes of estimating the required sample size, the following formula can be used, for confidence limits of 95%:

$$n = \frac{(1.96)^2}{d^2 \frac{N-1}{N}} + \frac{(p.q)}{\frac{(1.96)^2}{N} p q}$$

N is the total number of individuals in the entire population. If N is large enough so that the fraction $\frac{N-1}{N}$ is approximately unity, population size can be ignored and n becomes

$$\frac{(1.96)^2}{d^2} (p.q)$$

In this formula, p is the proportion of individuals possessing the characteristics under study, q is (1 - p) and d is one-half the total desired width of the 95% confidence interval.

If we want to have 95% confidence that the sample will not be off by more than about twice a standard error of 2% in either direction, in other words, that the "true" proportion will lie between 48% and 52%, the sample size must be calculated, using the above formula.

(3) Questionnaire Development

The services of a social scientist or psychologist are essential for the development of a questionnaire. The cooperation of the Labor-Management Policy Team is strongly recommended. A questionnaire employed in a survey of employee opinions and attitudes could contain the following sections:

(a) Job Satisfaction - A number of instruments are available, but one of the best and most reliable is the J.D.I. (Job Description Index), an instrument designed to measure satisfaction in the areas of the work itself, pay, promotion, co-workers, and supervision.

(b) Work Alienation - A set of questions should be designed to ascertain whether the worker finds his work engaging and rewarding. The alienation index is highly correlated with the section of the J.D.I. which deals with the work itself.

(c) Work Incentive Preference - This section aims to determine which job incentives are considered most important. The employees are asked to rank, in order of preference, incentives which, in their opinion, contribute to an "ideal job".

(d) Productivity - A set of questions designed to ascertain the worker's knowledge of, and general feeling about, the concept of productivity.

(e) Innovation - Analysis of responses to a series of questions concerned with the individual's opinion about change, will indicate his receptivity to change in the work place. This section is important because it can be used as a basis for the selection of result units where productivity improvements would be most readily accepted.

(f) Specific Questions - Specific areas of the employee's work environment are covered such as: satisfaction with equipment, work-rules, chance to develop new skills, satisfaction with training, and perceived ability for the job. The questionnaire should also contain several open-ended questions soliciting comments and suggestions.

(4) Administration

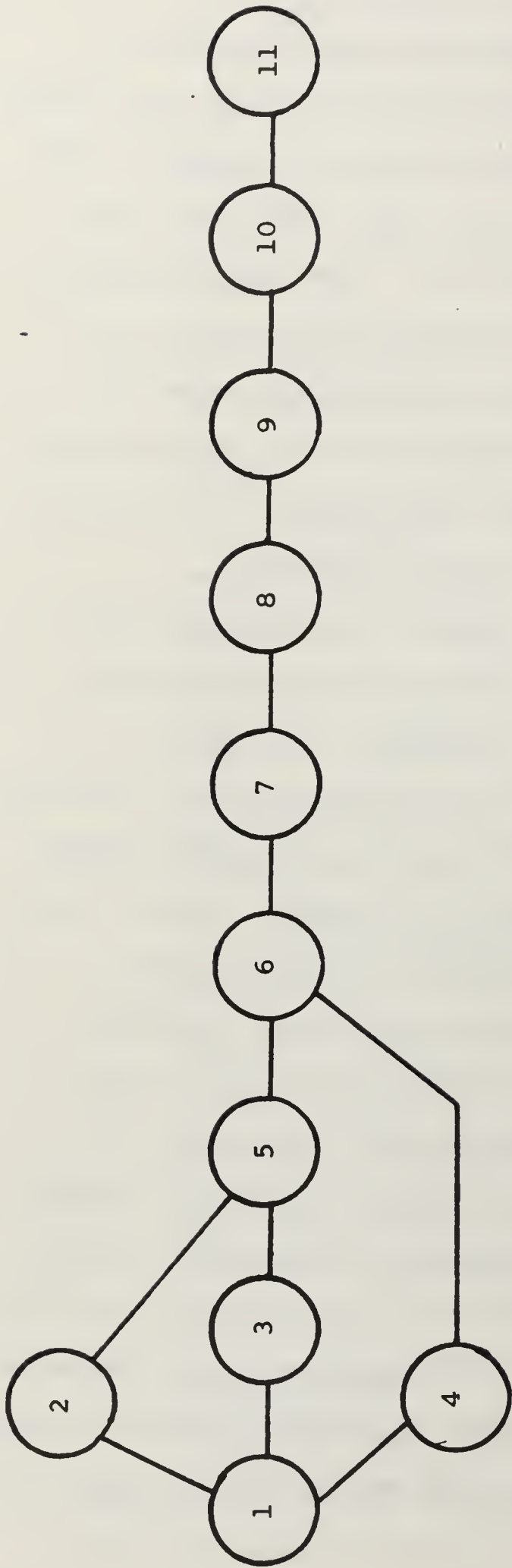
Plans for administration of the survey must include not only practical strategies for physical administration, such as scheduling, determination of locations, time, etc.

but also the most important consideration of communication with the people who will participate in the survey. It is essential to convey to the respondents the fact that their responses will be completely confidential. Complete confidence on the part of the individual that he will not be identified by name is absolutely essential, as is the guaranteed knowledge that the questionnaire will not be handled by any other member of the municipal work force at any level.

The individual should be assured that the results will appear only as group statistics, never as individual responses. In addition, he should be told that his participation is voluntary. It is highly advisable to hire an outside agency or individual to direct the survey, since it will further assure independence and objectivity.

If at all possible, the survey should be administered during working hours and at the work site. The attached PERT Chart (Chart I) describes the steps involved in a general survey which employs the technique of stratified random-sampling. The general survey should occur at the start of a productivity program and be repeated at its conclusion, in order to assess possible changes in attitudes which may be derived from productivity improvements.

PERT CHART - PROCEDURES FOR SURVEY ADMINISTRATION



1. Obtain complete list of employees
2. Sampling Procedure
3. Formal Correspondence
4. Preparation for Administration
5. Notification of Survey: Dates and Places
6. Administration
7. Scoring
8. Keypunch Operation
9. Computer Printouts
10. Results Tabulated and Analyzed
11. Written Report

PERT CHART - PROCEDURES FOR SURVEY ADMINISTRATION
(Stratified Random Sample)

The following are guidelines for administration of a stratified random sample survey:

Step 1. Obtain complete list of employees

The list should be classified according to the following categories:

- A. Department
- B. Salary
- C. Job Title

Step 2. Sampling Procedure

- A. The list is segregated into X number of strata. For example, if there are 7 functional categories and 5 salary levels, there will be a total of (7 x 5) 35 separate lists.
- B. Assign a number to each individual within the 35 lists constituting the different strata.
- C. Select a predetermined proportion from each list by drawing numbers from a table of random numbers.
- D. The name of the individual selected for the survey will appear on the questionnaire on a detachable piece of paper which will be removed as soon as he or she appears for the survey.

Step 3. Formal Correspondence

A. Letter to Department Heads

- (1) Information re: Productivity Program
- (2) Information re: Survey
 - a. purpose
 - b. technique
 - c. participation
- (3) Attach:
 - a. letter
 - b. request for a person to act as liaison with program
- (4) Request full assistance and cooperation

B. Distribution of letter to employees from Survey Director

- (1) Background of the Productivity Program
- (2) Purpose of the survey
- (3) How employees were selected
- (4) Confidential nature of survey stressed

C. Letter to Labor-Management Policy Team

- (1) Request they speak with their respective groups and request cooperation
- (2) Explain survey timetable

D. Letter to Departmental Liaison

- (1) Outline methodology of administration of survey
- (2) List employees to be surveyed

Step 4. Preparation for Administration

- A. Arrange for physical sites for administration
- B. Assign time and day (per department) for administration

Step 5. Notification of Survey: Dates and Places

- A. Prepare a list of employees selected from each department and notify proper liaison personnel in each department
 - (1) Forward list of employees selected from department to liaison personnel
 - (2) Notify liaison personnel (by phone) of time, day, and location of administration
- B. Note which employees are unable to respond and for what reason

Step 6. Administration

- A. Distribute questionnaire
- B. General instructions (stress confidentiality)
- C. Answer questions
- D. Collect completed questionnaires

Step 7. Scoring

- A. Information from questionnaire is scored and responses are assigned appropriate values
- B. Data sheets are double-checked for accuracy
- C. Responses to open-ended questions are reviewed

Step 8. Data Sheets Are Key punched

Step 9. Computerization

Step 10. Tabulation and Analysis of Results

Step 11. Written Report Prepared

b. PIE Surveys

Smaller surveys can also be conducted within the individual PIEs to determine the impact of productivity improvement upon those workers directly affected. The PIE surveys generally include all employees within the unit. The Pre-intervention PIE survey helps the productivity analyst identify some of the problems he might encounter within the unit. In addition, the results could suggest changes in work-design, assignment of tasks or training. The Post-intervention PIE survey is designed to assess the changes and provide valuable data on the relationship between productivity improvement and worker satisfaction.

c. Interviews

In addition to the general survey, involving rank and file employees and supervisors, it is advisable to obtain similar information from middle and top management. Structured or semi-structured interviews are advisable. They should include the same types of topics covered in the general survey questionnaire. A similar instrument may also be devised to interview labor union leaders who are participating in the program.

2. Communication Program

The Communication program should be both informational and educational. It should clarify basic concepts about productivity; educate the work force, inform the taxpayer of the expected results of increased productivity, and keep information about ongoing productivity improvement efforts circulating. The education campaign should train both labor and management in the elements of productivity improvement. Printed material is quite effective for these purposes, as are conferences and workshops. One goal of written material is to encourage the "non-participant" to get involved, by showing him what has been achieved. The informational campaign should also relate the productivity program goals and activities to the public.

The first communications step should be the development of a production schedule, with specific monthly programmatic goals. The schedule should be coordinated with the timetable of the systems analysts who are involved in the PIEs.

The first major educational effort should involve the development of a Question and Answer Document (Q&A) (sample appended) to define

productivity, describe the productivity program, and explain the ramifications of productivity improvement to labor and management. Prior to publication, the Question and Answer Document should be pretested in a small number of result units to insure maximum comprehension.

Another first year educational endeavor should be at least one conference on productivity for top level management and labor leaders. The conference would benefit from the participation of representatives from other local public sector productivity projects. These individuals can discuss their own efforts from a practical point of view and can encourage the representatives from your municipality to become involved in a productivity program. The conference participants should discuss the various approaches to public sector productivity improvement to gain a better understanding of what can occur.

Toward the end of the micro stage the communications staff should design a plan for implementation of training necessary for the macro stage of the project. The plan should outline the methodology which will be used to teach departmental labor and management liaisons, and a training manual should be prepared (sample appended). The training manual should outline the steps required to conduct a productivity improvement effort, as well as the responsibilities of the labor and

management liaisons. Smaller workshops to further explain measurement procedures to the liaisons will be needed. In addition, similar training should be planned for the departmental labor and management teams.

Special brochures should be written to transmit the results of micro stage PIEs to the work force. They should be concise, informative accounts of what transpired in a PIE, giving credit to the involved employees for the productivity achievement. Photographs and individual credits are recommended. Before publication, a draft should be distributed to small groups of labor and management representatives within the PIE. In this way, constructive criticism is elicited and the employees themselves are involved in the preparation process. As each PIE is completed, the brochures should be distributed to the entire work force. In this way all participants are kept informed of the program's progress and successes. Additional productivity improvement efforts can be generated through this type of communication.

As the number of PIEs increase, it may become difficult to continue to develop individual brochures for each completed PIE. However, in order to maintain momentum, it is necessary that new PIEs

receive publicity and that credit be given to the liaisons. A quarterly newsletter can achieve this objective.

Another effective means of encouraging employee participation is an information booth. A portable booth can be taken to various government locations within the municipality and should be manned by a program staff member. The booth should display productivity program materials for the employees to read. The staff member would then be available to answer questions on the program. This is an effective way to generate employee feedback. A schedule of the booth's location should be made available to the Labor and Management Policy Team, who may show their support for the program by occasionally joining staff members at the booth.

An additional communications tool which is strongly recommended, is the presentation of recognition awards to the entire unit involved in completing a productivity improvement effort. Certificates can be presented to the members of the departmental labor management team and all involved employees. These sessions can be recorded with photographs for use in the newsletter or other publications.

B. Micro Stage

The micro stage involves the selection of a few result units as productivity improvement efforts (PIEs) within the municipality. The PIEs in the micro stage require very close supervision by the program staff. These first target areas should be selected on the basis of the following criteria:

1. Success Potential - It is essential to the productivity program that the first productivity improvement efforts be successful in order to gain support. Initial failures make future efforts more difficult.
2. Time for Completion - It must be possible to achieve results within a year's time in the initial PIEs, in order to maintain the necessary labor and management support for the continuation of the program.
3. Data Base - The existence of prior data on the systems operations precludes the necessity for establishing new reporting procedures prior to implementation of a plan for change. This reduces the time required before remeasurement of the system can occur.

4. Management Support - The support of the department head is critical in gaining access to information required for completion of the PIE.
5. Union Support - A balance of union interest within the department enhances the chance for success.
6. Potential Number of Employees Involved - Initial productivity improvement efforts should impact heavily upon the total operations of a department. Therefore, the staff must assess both the size of the result unit and the effect that the unit has on other operations within the department, or upon other departments within the municipality.
7. Transferability - To what extent can the methods or procedures established for this PIE be transferred to other departments?
8. Visibility - The selection of one or more result units which are highly visible to the public broadens the program's support base with the local citizenry.

While the productivity program staff analyst has ultimate responsibility for achieving success within a PIE, cooperation with a labor-management team drawn from the result unit can increase the possibility of success.

The department team should be composed of labor and management representatives, selected respectively by the union and the department head. This team can be used to help establish a definition of the problem within the unit, aid in the gathering of data, assist in analyzing the data, and participate in the development of a program for change. In addition, the team can aid the staff analyst in attaining support for the program among the employees, which is invaluable when the changes are being implemented.

The micro stage involves the following five major steps from initiation to completion: (1) entry, (2) observation, (3) data analysis, (4) Productivity Improvement Plan (PIP), and (5) remeasurement and evaluation.

1. Entry

a. Once the result unit has been selected, the staff analyst must meet with the department head and key management personnel to define the goal of the unit and its relationship to the overall mission of the agency. The department head should assign, as his representative, the middle manager with administrative responsibility

for the result unit. This person should serve as the official management representative. He is the key to a successful PIE, since he is the person responsible for the operation of the unit. He is also the person most likely to be directly affected by a critical review of the unit. Therefore, making him an integral part of the study process should decrease his resistance and enlist his support. His support is essential for obtaining departmental approval of the proposed program for change and implementation.

b. The staff analyst must also confer with the union leader within the department to elicit his ideas and suggestions, as well as his definition of the problems of the unit.

c. On the basis of the initial information gathered from the department head, management representative, and union leader, the analyst can define the objectives of the study and share them with the department labor-management team. Together they can formulate a plan of operation.

2. Observation - This step involves the collection of written data, observation of the unit in operation, interviews with employees from each

job category, and research into similar systems. If data is attainable and quantifiable, data collection provides one objective source of information. Interviews can provide a more in-depth understanding of both the data and what it indicates. A search of the literature to find where similar productivity improvements have been conducted on the part of other municipalities is also important.

3. Data Analysis - The assemblage and interpretation of the data, together with the results of the interviewing, should reveal to the analyst the crux of the unit's problem. The problem areas within the unit should be indicated. Analysis should lead to the selection of measurements which reflect the productivity of the unit as a whole.
4. Productivity Improvement Plan (PIP) - Analysis leads to the development of a comprehensive plan for change or a Productivity Improvement Plan (PIP). This plan should be selected on the basis of a cost-benefit analysis of alternative proposals.

The staff analyst evaluates the system, not the individuals involved in a system. Therefore, while the improvement plan may introduce work standards, they are set on the basis of group rather than individual performance. The emphasis of the analysis on systems rather than on individuals serves to reduce worker resistance.

The PIP must be formally accepted by top management and in addition, should have the approval of both the union leader and the labor-management team. The approval process often involves negotiation at all levels, to achieve a plan which is acceptable to all parties, yet accomplishes the original objectives set forth by the productivity staff.

Prior to implementation, the improvement plan must be explained to everyone in the result unit, i.e., middle management, supervisors and workers. It is wise to meet separately with each group to explain the plan, outline its objectives, and iron out anticipated implementation problems which are foreseen by those who will be directly involved in effecting the changes. Any training

required for the new plan must be carried out at this time. New reporting or monitoring procedures must also be thoroughly explained, and responsibility assigned for their execution. It is important that everyone in the PIE understand the basis upon which success will be measured. A timetable must be established for introduction of the new system, and a reasonable "test period" established between implementation and evaluation.

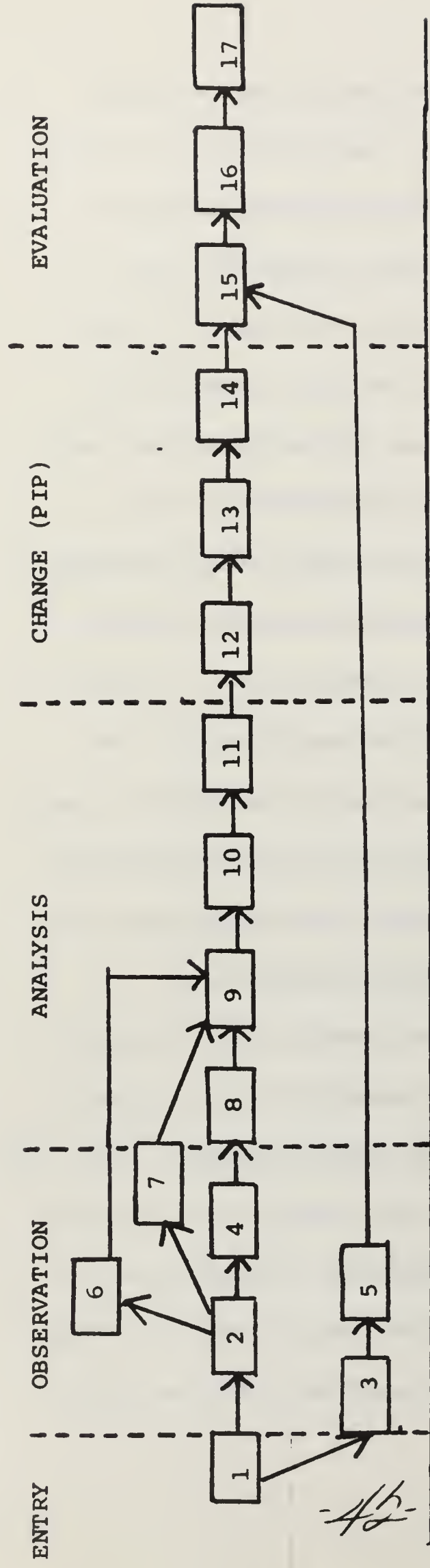
The presence of the productivity analyst is critical during the implementation step. This is the time during which the success or failure of the improvement program is determined. The analyst must be present, not only to ascertain whether the plan is being properly implemented, but also to respond to any problems which might arise during the change process.

5. Remeasurement and Evaluation - At the conclusion of the test period, the productivity staff analyst is ready to remeasure the system to determine whether the changes have resulted in increased productivity. The results of the remeasurement

can lead to suggestions for further systems change, or can solidify the continuation of the original plan. A written evaluation report provides documentation of the results for management and supplies the basis for a feedback report to the work force. Feedback of results to the employees is very important as it provides them with the information they need to alter and improve their own performance. The evaluation step should contain an ongoing monitoring plan for the new system, in order to insure continuity once the staff analyst has left. In addition, the evaluation report should include a plan for reporting future results in the PIE both to management and the productivity program staff on a periodic basis.

During the micro stage, the productivity analysts should submit monthly progress reports to the program office on each of their PIEs in order to insure that they are progressing on schedule. Any problems which arise should be solved early so that delay in completion is avoided. The Program Evaluation Review Technique Chart (Chart II) lists and describes each step of the micro stage in more detail.

PERT CHART - PROCEDURES FOR CONDUCTING A PRODUCTIVITY IMPROVEMENT EFFORT



1. Liaison established between productivity program staff, department, and union

2. Background information obtained

3. Attitudinal Survey (Before)

4. Historical data collected/Baseline measurements/Define scope of the PIE

5. Educational campaign directed to departmental personnel

6. Literature search

7. Observation of the system/Interview and brief department personnel

8. Analysis of baseline measurements and

9. Preparation of synopsis report

10. Labor-Management Policy Team approval of PIE

11. Department labor-management team approval

12. Department Head approval of PIP

13. Briefing of departmental personnel

14. Systems change introduced/Training

15. Remeasurement of system

16. Attitudinal Survey (After)

17. Evaluation/Final Report

PERT CHART - PROCEDURES FOR CONDUCTING A PRODUCTIVITY
IMPROVEMENT EFFORT

EXPLANATION OF STEPS

Step 1. Liaison established between Productivity Program Staff, Department and Union

- A. Meeting - Program Director and Department Head
- B. Meeting - Program Staff and Union Representatives
- C. Meeting - Staff and Departmental Representatives
- D. Introductory tour of Department for Program Staff
- E. Development of a schedule for observations

Step 2. Background information obtained

- A. Table of organization
- B. Annual reports
- C. Budget and personnel data
- D. Trade and/or professional journals
- E. Other jurisdictions
- F. Library research
- G. Check on data that Department collects

Step 3. Attitudinal Survey (Before) - Questionnaire

- A. To determine attitudes before implementation of systems change
- B. Distributed to all involved personnel

Step 4. Historical data collected/Baseline measurement/
Define scope of PIE

- A. Method for baseline data collection developed
- B. Method explained to employees
- C. Baseline data collection begun
- D. Past records researched
 - 1. personnel/manpower
 - 2. cost/unit/capital
 - 3. input/output
- E. New record keeping methods established to collect baseline data if previous methods do not meet the needs of the PIE staff
- F. Define scope of productivity improvement effort

Step 5. Education Campaign directed to departmental personnel

- A. Educational plan prepared
- B. Awareness of productivity stimulated
- C. Question and Answer Document distributed
- D. Distribute materials illustrating changes, how changes are made, and the role of the individual in systems change

Step 6. Literature search

- A. Specialized research
- B. Bibliography developed
- C. List of appropriate periodicals

Step 7. Observation of the system

- A. View system in operation from beginning to end
- B. Place PIE in perspective with rest of Department and other agencies
- C. Interview as many employees as possible within the unit with a view toward understanding the system and their role in it. Collection of verbal data should include:
 - 1. description of system
 - 2. complaints about system
 - 3. suggestions for change
- D. Note problems
- E. List potential systems changes
- F. List possible areas of concentration for team personnel (e.g., need to extract existing data or generate new data for measurement)
- G. Write up observations
- H. Further explanations about productivity program to employees

Step 8. Analysis of baseline measurements and measurement report

- A. Prepare flow chart diagram of system
- B. Describe system characteristics, i.e., inputs, outputs, goals, etc.
- C. Write complete systems analysis report

Step 9 Preparation of Synopsis Report

- A. To include the following:
 - 1. background
 - 2. systems analysis
 - 3. observations
 - 4. problems
 - 5. criteria
 - 6. importance
- B. Plan of action
- C. Areas with greatest need for concentration of effort should be noted
- D. Integrate results of "Step 8"
- E. Do additional research as necessary
- F. Write Synopsis Report

Step 10 Labor-Management Policy Team (LMPT) approval of PIE

- A. Presentation to LMPT
- B. Short summary of PIE prepared for distribution to LMPT
- C. Answer questions from LMPT concerning PIE

Step 11 Department labor-management team approval of PIP

- A. Develop a list of potential systems changes
- B. Discuss potential systems changes with labor and management
- C. The rationale for their implementation
- D. Preparation of PIP for PIE
- E. Contingency plans for partial adoption of Productivity Improvement Plan

Step 12 Department Head Approval of PIP

- A. Distribute draft of synopsis report to Department Head
- B. Amplify synopsis report
- C. Determine all details of measurement, i.e.
 - 1. technique
 - 2. time period
 - 3. reliability
 - 4. personnel
- D. Establish what the objectives of the PIE are and how measurements will further these objectives
- E. Analysis and synthesis of data in light of research, observations and conclusions
- F. Approval of Productivity Improvement Plan (PIP)

Step 13 Briefing of departmental personnel on changes

- A. PIE explained to personnel--purposes and goals
- B. Labor and management's joint statement to employees about their expected role in the change process

Step 14 Systems change introduced

- A. Discussion with affected employees to explain changes
- B. Training and/or retraining completed
- C. Changes introduced
- D. Observation of new system for:
 - 1. items not being measured
 - 2. items not measurable
 - 3. general observations
- E. Schedule of remeasurement and reporting to productivity program established

Step 15 Remeasurement of system

- A. Changes monitored
- B. Measurement data (of the same type collected under the baseline phase) collected
- C. Analyze
- D. Feedback to employees on results of change (on-going process)

Step 16 Attitudinal Survey (After) - determine attitudes of employees after systems change

Step 17 Evaluation/Final Report

- A. Compilation of all materials required for the Final Report
- B. Write baseline section of Final Report to include
 - 1. background information
 - 2. systems analysis
 - 3. plan of action to be taken
 - 4. action taken
 - 5. results of initial questionnaire
 - 6. problems encountered
 - 7. solutions devised

- C. Remeasurement data collection report completed
- D. Observations made after change introduced
- E. Evaluation on basis of data and observations made
- F. Consolidation of:
 - 1. background section
 - 2. baseline section
 - 3. systems change section
 - 4. evaluation section
- G. Write Final Report

C. Macro Stage

The successful completion of the micro stage establishes the basis for a comprehensive productivity program or the macro stage. The macro stage is the time during which all departments within the municipality will become engaged in productivity improvement. During the micro stage, a methodology for achievement has been established and a multiplicity of measurements tested for application in other PIEs. During the macro stage the initial results will be transferred.

Productivity improvement is not a one-shot undertaking. It is the continuous responsibility of the municipality. The macro stage represents the extension or institutionalization of productivity improvement to all major departments and operations within the municipality. One method for achieving total participation is to transfer the responsibility for developing productivity improvement efforts to each department. The productivity program staff, under this approach, serves as consultants or PIE Advisors to departments, rather than as actual "change agents". They provide technical assistance to departments initiating improvement programs. This represents a transference of responsibility for productivity improvement from the department to the individual work unit.

A municipality has several options for expanding its productivity program, in addition to the one listed above. Rather than utilizing the program staff analysts as consultants, the program staff can be increased to take on additional PIEs. Another alternative is for each department to hire or assign a staff person full-time to assume total responsibility for productivity improvement within the department. In either case a central productivity program staff is still necessary, both to monitor field projects and to accumulate and evaluate data on the range of programs underway. The first plan for expansion is recommended, based on prior experience.

To decentralize responsibility for productivity improvement during the macro stage to the work unit level, departmental personnel must be assigned and trained to carry out this function. Therefore, each department must appoint a labor and management liaison to be responsible for productivity programs within the department. This will be a part-time assignment. The liaison's duty is to develop department productivity proposals, with the approval of the department head, as well as to monitor the progress of the various PIEs. The liaisons are responsible for all reports to the productivity program and are trained by the program staff prior to assuming their liaison roles. (Sample Training Manual appended.)

If a department is small, the liaison will also be responsible for conducting the PIE. However, if the department is comprised of a number of divisions, sections or units, labor-management teams must be chosen for each individual PIE selected. The liaisons will act as monitors of the PIE and as the official contact persons with the productivity program staff.

The size of each labor-management team is dependent upon the number of employees within the PIE. The labor member(s) should be selected by the union; the management member(s) by the department head.

A PIE is considered successful only if both labor and management have participated in the study, analysis and implementation of change. This joint participation should result in a willingness within the PIE to adopt the recommendations for change designed to improve the operations of the unit. This approach also provides a structure by which labor and management within the PIE can continue to expand upon their initial productivity improvement effort.

Once the labor and management teams have been selected, they must be trained in how to develop and conduct a PIE. Responsibility for training both the liaisons and the labor-management team rests with the productivity program staff. One staff analyst should be assigned as a consultant or

PIE Advisor to each department within the municipality.

The PIE Advisor should be responsible for the following functions:

- aid labor-management teams in developing a productivity improvement effort proposal for their unit
- evaluate the PIE proposal in terms of how well it meets the selection criteria of the productivity program
- train the department liaisons and labor-management team in methods of data collection and analysis
- consult with the department liaisons and labor-management team on the conduct and scope of the initiated studies
- advise the labor-management team on the selection of measurements for each individual PIE
- review and approve the productivity improvement plan (PIP)
- aid in obtaining approval of the PIP from the department head
- assist in the development of the implementation program
- aid in developing a system for remeasurement and evaluation
- aid in developing a reporting system to insure the continuity of the new system
- feedback of results to participants

Members of the department labor-management team serve as the change agents during the macro stage and, with

assistance from the PIE Advisors where necessary, are responsible for the following:

- attending training workshops
- meeting to select and write a productivity proposal for submission to the productivity program PIE Advisor
- collecting and analyzing data
- selecting appropriate measurements
- developing a productivity improvement program (PIP)
- seeking department head approval of the PIP
- developing an implementation program
- briefing the employees in the unit on the systems change
- implementing and monitoring the new system
- remeasuring and evaluating the system
- feedback of results to participants

The productivity program should accept only the number of PIE proposals which it has the staff to monitor. Therefore, acceptance of PIE proposals should be made on the basis of how well they meet the criteria for selection of the productivity program. If the productivity program is going to be considered part of the negotiation process through productivity bargaining, the number of productivity improvement efforts during the macro stage must be sufficient to produce meaningful savings by the time the contract is going to be renegotiated.

D. Measurement

The following is a description of some types of measurement which can be utilized to measure productivity improvement in the public sector:

1. Cost savings - the ability of a unit to maintain or increase its output with fewer resources or inputs
2. Output per manhour - the ability of a unit to produce more physical units per manhour
3. Physical units per employee - this is an output measure per unit of input (labor)
4. Throughput time - the length of time necessary for something to be processed through a system
5. Downtime - the duration of time that personnel, material or equipment are out of operation or non-functional.

While a primary measurement is helpful, secondary and tertiary measurements are also useful. These give the analyst a broader statistical data base for overall evaluation of the system.

Actual methods of change can be grouped into a number of categories including:

1. Technological Improvement - introduction of new equipment which alters the methods by which the job is performed.
2. Rescheduling of Activities - the rescheduling of activities to times when they can be accomplished more efficiently, based upon productivity ratios

3. Redeployment of Staff - reassignment of staff to meet peak service demand
4. Reassignment of Tasks - reallocation of tasks among employees based on their qualifications and ability to perform specific duties
5. Inventory Control - inventory system designed to develop procedures for reordering materials and equipment.

Chart III describes typical productivity problems and the methods that can be used to alleviate them, with examples.

Methods of Improvement Employed to Increase Productivity

Problem	Method	Examples	Result/Benefits
Backlog of reports and documents to be typed	Technological improvement	Word processing center to allow for machine dictation and faster typing	Reorganization of typing pool from 41 to 17 typists
Backlog of lines to be painted on County roads	Technological improvement	"Super-striper" which automatically paints lines with quick-drying paint	Reduction from a 15-man crew to a three-man crew. Less slowing down of traffic
Receiving large percentage of building complaints having no violation	Rescheduling of activities	Assignment of inspectors to the office one day per week to screen Building Department cases	Reduction in the number of no-violation cases inspected and number of inspections per complaint
Delay in patient care at a County Medical Center Emergency Room	Redeployment of staff	Triage nurse to screen cases, development of walk-in clinic during peak hours to handle non-emergency cases and establishment of new shifts for nurses to match staffing with patient demand	Decrease in the average waiting and treatment time for patients
High percentage of trucks in for repairs	Rescheduling of activities and Inventory control	A preventive maintenance program which includes: 1) inventory control 2) scheduling of vehicles for repair & inspection 3) an education program for personnel on the proper use of trucks 4) night shift created -- responsible for preventive maintenance of trucks	13% decrease in downtime of vehicles

CHART III (continued)

Problem	Method	Examples	Result/Benefits
Uneven workload distribution and excessive travel time for inspectors	Rescheduling of activities	Inspection areas redrawn; redistributing assignments; inspections scheduled by geographic location	Workloads equalized 15.9% increase in inspections per day decrease in miles travelled
Inability of maintenance crew to maintain cleanliness of building	Reassignment of tasks	Group Team Cleaning instituted; training program; educational campaign on building cleanliness for employees	61% improvement in minutes of productive time. Improved cleanliness of building and employee morale. 41% decrease in absenteeism
Excessive amount of mileage, fuel and man-hours utilized for refueling	Reassignment of tasks	Assignment of one large tanker to service 19 small trailers by travelling to the site.	65.4% savings in miles travelled. 6.5% productivity increase for entire division.
Inability to investigate and recertify monthly case load	Reassignment of tasks	Consolidation of units; specialization of duties to free examiner's time for field work; equalization of workload; standardization of tasks; increased supervisory support.	21.3% increase in the number of cases completed per examiner per month.

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E. Productivity Bargaining

Productivity bargaining is a form of collective bargaining by which labor and management collectively negotiate a formal agreement which rewards workers for productivity improvement by sharing the savings achieved. In order to determine what savings are achieved, one needs to develop a formula which transforms a productivity improvement index (measurement) into a dollar savings amount. With the formula you must be able to compute the savings for a particular result unit, for an entire department, or for the municipality as a whole.

- If the union negotiates for a municipal-wide unit, the formula must reflect an aggregate of improvement efforts for the municipality as a whole. A method which allows for equal sharing of the savings among all employees, rather than just for those responsible for undertaking the productivity improvement efforts, eliminates the problem of differentiating increases by title and department. In addition, this method does not punish those departments whose productivity is already high, or unduly reward those departments who raised their productivity from a low base. Finally, the sharing of savings serves as an incentive for continued employee participation, since productivity savings are calculated on the basis of change from the preceding year.

The following "improvement" formula can be used to measure productivity improvement within a result unit:

$$I = \frac{\sum_{i=1}^k (C_{oi} \times U_{ti})}{\sum_{i=1}^k (C_{ti} \times U_{ti})}$$

This formula reveals productivity improvement in the output/input relationship by measuring the unit cost of output.

I = degree of improvement

c = unit labor cost

u = number of units of output

o = base period

t = present (remeasurement) period

i = result

Only labor costs are included, unless productivity was achieved largely through the introduction of new equipment.

There are only four items of information that are needed to calculate aggregated productivity improvement:

(1) the labor budget for the base period, (2) the labor budget for the remeasurement period, (3) units of output in the base period, and (4) units of output in the remeasurement period.

$$I = \frac{\sum B_{oi}}{TB_t} \times f_i$$

The above formula is a simplified version of the formula used to calculate improvement within a result unit.

B = departmental labor budget

- TB = total labor budget of all PIEs

f = relative improvement in output

The resulting improvement factor yields a percentage which can be transformed into dollar savings for the municipality as a whole. Labor and management can then negotiate a shared benefits plan. The savings can be distributed among the work force in a number of different ways. This kind of economic (or non-economic reward) distribution is a proper subject for productivity bargaining.

F. Incentives

One of the stated basic assumptions is that it is important to maintain labor-management cooperation and employee support. Therefore, it is proper to employ an incentive system to guarantee continued employee cooperation. Productivity improvement benefits taxpayers, management and labor. Taxpayers benefit through better services at less or the same cost, and management receives the benefit of improved operations. Employee incentives can take many different forms, for example, increased training, job enrichment, wage increases, or additional fringe benefits. The important thing to remember is that the cost of a productivity incentive is paid for from productivity improvement savings, and does not represent an expenditure for which additional taxes have to be raised.

One incentive system recommended for consideration is the Productivity Benefit Increase Plan (PBI). PBI represents a unique approach to the development of an employee incentive system for productivity improvement. The PBI Plan is a public sector analogue to profit sharing plans in the private sector. PBI involves the establishment of a shared savings deferred compensation trust fund built from labor's share of the savings accrued as a result

of improved productivity. The size of the fund is based upon the annual improvement factor, which serves as the basis for the monetary contribution to the PBI fund for the following year.

Once the initial size of the fund is established, each individual employee's share must be determined. An equal dollar share for all employees within the bargaining unit is recommended if productivity has been measured on a unit basis and not on an individual basis. Equal shares would credit each employee for his/her contribution to the total improvement on a more equitable basis. This approach also provides the greatest benefit to those earning the least, since it is not based upon a percentage of salary earned.

The trust fund also has eligibility requirements, i.e., being an employee for one full year to qualify for a share. Since the plan is based upon deferred compensation, an employee receives his/her share upon termination of service.

1. Benefits to Labor

The PBI Plan has personal financial advantages for the employee, foremost of which is that the trust fund generates additional earnings through investment. In addition, the money in the trust fund

accumulates tax-free and is not taxable until drawn upon, at which time it is subject to a much lower tax rate than ordinary income. Also, the plan encourages active employee participation in the productivity program since the continuation of the program builds up the trust fund, thereby increasing each employee's share.

2. Benefits to Management

Adoption of the PBI Plan will reduce municipal labor costs. This is due to the fact that PBI is not a part of payroll and should not be considered part of annual compensation upon which most fringe benefits are calculated. PBI will also provide management with an additional tool with which to improve operations.

3. Benefits to Taxpayer

A taxpayer benefits from PBI if it stimulates increased productivity because increased productivity can mean a decrease in the growth rate of property taxes, as well as better quality services for the public. Through productivity improvement more and/or better services can be delivered at the same or slightly higher cost.

GLOSSARY OF TERMS1. PRODUCTIVITY

A ratio of the amount of results (output) achieved to the amount of resources (input) utilized.

2. INPUT

The resources utilized by a department or "result unit" to produce an output. Example: equipment, personnel, and supplies.

3. OUTPUT

The results obtained from the utilization of inputs, e.g., either a service to the public (direct) or to another municipal agency (public-indirect).

4. RESULT UNIT

A systematically combined series of inputs which produces a service (products) for the public. Example: A Medical Center's Emergency Room and a Department of Social Services' Recertification Unit are result units, providing services to the public directly. A Department of General Services, Purchasing Division or Custodial Maintenance Division provide services to other municipal agencies (public-indirectly).

5. PIE

A Productivity Improvement Effort is an activity intended to increase the productivity of a department or division of municipal government by improving its systems or procedures.

6. PIE PROPOSAL

A document relating to a specific department or division, submitted to the productivity program for consideration and acceptance. The proposal contains background information and operational procedures of the result unit, selection and availability of measurement data, and a plan for productivity improvement.

7. PIP

A Productivity Improvement Plan is a document relating the plan of action to be taken in a PIE, for the purpose of achieving productivity improvement.

8. PIE ADVISOR

A staff member of the productivity program who is responsible for helping the liaisons develop PIE Proposals from their departments. (At times referred to in the narrative as change agents or productivity staff analysts).

9. LABOR-MANAGEMENT POLICY TEAM (LMPT)

The LMPT is the policy making body for the productivity program. It is composed of union and management representatives selected for their interest in productivity improvement.

10. PERT

Program-Evaluation-Review-Technique is a method whereby the sequential order of steps necessary to undertake a specific activity is graphically shown.

11. MICRO STAGE

The period of time during which a few select productivity improvement efforts (PIEs) are undertaken.

12. MACRO STAGE

The period of time during which institutionalization of productivity improvement occurs within all major departments.

13. LIAISONS

Management and labor representatives who have been selected by their department head or union leader to work with the productivity program in undertaking productivity improvement efforts within a department.

14. DEPARTMENTAL LABOR-MANAGEMENT TEAM

Additional labor and management personnel selected to aid the liaisons in conducting PIEs within specific result units.

15. BASE PERIOD (Reference Period)

A segment of time during which activities (inputs and outputs) have taken place in a result unit. It is used as a basis (i.e., base point) for calculating later changes in input and output activity in that result unit.

16. BASELINE DATA

The accumulation of all measurements obtained during the reference (base) period.

17. REMEASUREMENT PERIOD

A segment of time after productivity improvements have been introduced into a system during which data is collected on the same specific tasks or activities as previously measured during the base period and a comparison of data is made.

18. PROPOSAL REVIEW COMMITTEE (PRC)

A group composed of the program director, staff and consultants which meets to review and approve PIE Proposals.

19. FEEDBACK

A procedure by which a productivity PIE Advisor utilizes graphs and charts to show members of a result unit their productivity improvement progress.

20. SYSTEM ANALYSIS

Applies the scientific method to the solution of practical problems. It places emphasis on describing, explaining and predicting the performance of systems under varying conditions.

21. CASE STUDY

A teaching method which instructs the students by example. The case study method employs the identification and analysis of problems in organizationally relevant situations similar to those which learners will encounter at work.

22. DATA BANK

A store of statistical information.

23. ATTITUDINAL SURVEY QUESTIONNAIRE

A written document composed of a series of questions, which when completed by the employees, supplies statistical data on their opinions and attitudes concerning their work and a demographic profile of the work force.

24. DEMOGRAPHIC DATA

Statistical information about the work force, e.g., tenure, occupational levels, salary ranges, age, sex, education, etc.

25. MEASURE

A system of standard units which can reflect the productivity of a result unit.

26. AGGREGATION

A word used to denote the collection of units of primary data into a total, usually for the purpose of expressing them in a summary form, e.g., a method employed to combine individual improvements derived from disparate result units to yield a total productivity improvement.

27. STATISTICS

Numerical facts or data about people, business conditions, etc.; the science of collecting and classifying such facts in order to show their significance.

28. DESCRIPTIVE STATISTICS

Used for the reduction of large complex sets of data to a single number or small set of numbers which "describe" the set of data or the relationships among the sets of data.

29. CENTRAL TENDENCY

A value (as the mean or median) representative of an entire statistical distribution.

30. MEAN

The sum of the values (of data) divided by the number of values.

$$\begin{array}{r} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ \hline 15 \end{array} \quad \begin{array}{r} 3 = \text{MEAN} \\ 5 \overline{) 15} \end{array}$$

31. MEDIAN

That value which divides the total frequency into two halves. When the data is arranged in ascending and descending order, the median is defined as that number for which 50% of the observations lie below and 50% above.

1
3 -
7 ---Median
8
9

32. MODE

The value which occurs most frequently or is possessed by the greatest number of members of the population.

1
2
3 ----
3 ----Mode
4
5
6
9

SAMPLE PRODUCTIVITY CLAUSES FOR MUNICIPAL LABOR CONTRACTS

1. Nassau County - Section 7, "Joint Committees",
Number 1.

"The County and the Association will develop a comprehensive bilateral program to increase productivity, which will be formulated during the term of this agreement; provided, however, that none of the rights granted to the County or to the Association in this contract shall be deemed impaired by this provision."

2. Town of North Hempstead - Section XVIII
"Productivity Plan".

"The parties hereto agree to bilaterally formulate a plan to increase productivity during the term of this agreement."

3. Town of Hempstead - Section 27

"Productivity - The comprehensive bilateral program to increase and study productivity will be formulated."

4. Town of Oyster Bay - Article IX "General Provisions"
Section 9-10.0.

"The Town and Association shall participate in a comprehensive bilateral program to increase productivity, provided however, that none of the rights granted to the parties herein shall be deemed impaired by this provision."

PRODUCTIVITY QUESTIONS AND ANSWERS1. What can I do to help the productivity program?

Employee cooperation is the key to the success of the productivity program.

You can help by responding to surveys and by offering constructive advice to staff members when they begin a study of your department.

2. Will I be required to work harder?

The theme of the productivity program is work smarter not harder.

3. What is input?

Input is the number and amount of resources utilized.

4. What is output?

Output is the result obtained.

5. How can you define productivity?

Productivity is comparing the amount of results (output) to the amount of resources (input).

It is the achievement of increased service, with quality maintained by the use of more effective work methods.

6. What do you mean by productivity improvement?

Productivity improvement means changing procedures or using new technology to do each job in the best way possible. It can mean more effective and better quality service through rearranged work flow, changed work rules or new equipment.

7. How do you measure productivity?

Productivity is measured by comparing the amount of results (output) to the amount of resources (input). Resources include: (1) labor (2) capital (3) work system (4) equipment and supplies. Results (output) are the products manufactured or services performed.

8. Will I be able to contribute ideas?

Yes, your ideas are vital. Employees will be asked by the staff to contribute advice and ideas.

9. Will the productivity program cause any reduction in force?

The productivity program is a joint municipal-union effort and all parties have agreed that no loss of jobs will result from the operation of the productivity program.

10. In what way will the productivity program affect my career ladder?

If productivity improvements are accomplished in your work, it could lead to a faster climb on the career ladder. Improved productivity has been demonstrated not to necessitate changes in job specifications. Your present career ladder will not be damaged.

11. Will there be any order speed-ups?

No. The productivity program will not result in ordered speed-ups on the part of individual employees actually performing the service.

12. Will my job responsibilities change?

Possibly, but not to require more work than is specified for your position, just better ways of doing your work.

13. How does productivity affect my employer?

It enables the employer to respond to an increasing demand for services without increasing the tax burden on the citizen.

14. If the productivity program recommends staff reorganization in my department will I be retained?

Yes. Increases in productivity will not result in loss of work.

15. What is the productivity program?

It is a joint labor-management research and development program demonstrating the productivity of employer and employee in (name of municipality). What we are actually trying to determine is the effectiveness of new methods for doing the same work or improving production as a result of using new technology. Our attention will be on the work group and productivity improvements will focus on this level of the work force, not at the individual level.

16. How will the productivity program be conducted?

The productivity program begins with several months of research and education by the staff in the field of public sector productivity improvement. The staff, with participating department heads, union representatives and employees, will select a few study areas where initial productivity improvements will be implemented. During the second stage, the staff will act as consultants to other departments engaged in Productivity Improvement Efforts (PIEs).

17. How will I learn about the progress of the program?

The labor and management liaisons in each department will keep their co-workers advised of the productivity program's progress through meetings and newsletters.

18. Why should I as an employee actively support productivity improvement?

There are four basic reasons:

1. Salary or work benefit increases may be based on productivity increases.
2. Participation in the productivity program will give you a say in the decision-making process.
3. As a local resident and taxpayer, you may contribute to saving yourself and your neighbors taxes.
4. Increased productivity is an important tool in fighting inflation.

19. How will the productivity program effect my present position?

The productivity program will not have any effect at all on some positions. For others it may entail a new procedure or method of doing the job. The productivity program may result in retraining so that you will be better prepared for another job, without any reduction in pay or seniority.

Depending on your position, the productivity program may improve and better define your level of responsibility, provide more training in your particular field, eliminate unrelated duties if they exist, or even result in an upgrading of your position.

20. What effect will productivity improvement have on the taxpayer?

Productivity improvement will help to slow the rate of growth of government costs at the local level and help keep taxes down. The benefits from improved productivity in local municipal government may also be passed on to the taxpayer in the form of additional services and better quality service for the same cost.

21. What does productivity have to do with inflation?

Productivity improvement is one way we can combat inflation. When wages go up faster than productivity, the item produced or service given is inflated by the extra cost of producing it. This makes the item or service more highly priced. As a result of the price increase, the wages earned and used to make purchases have the same or less buying power.

22. How will the productivity program measure productivity improvement?

In those areas where employees participate in attempts to achieve productivity improvements, measurements of input and output will be made before and after joint efforts begin. These measurements will be used to evaluate the success of the total unit effort to increase productivity; they will not be used as individual standards.

23. Will safety standards be neglected as a result of improved productivity?

No. A change may only result in an improvement of safety standards.

24. If I produce more, will some people be laid off?

No one will be laid off as a result of the productivity program. Productivity improvements will be used to meet the increased need for services.

25. Will the productivity program have any affect upon the graded service salary plan?

No effect is expected on the graded service salary plan.

26. Can improved productivity result in a better contract for labor?

Yes. Improved productivity can be used to achieve increases in salary or work benefits.

27. What is productivity bargaining?

Productivity bargaining is a method of negotiating increases for employees based on real increases in the productivity of government service. Productivity bargaining means that employees share directly in the savings realized through joint labor-management productivity efforts.

28. Do you have any questions about the productivity program which you would want us to answer?

Send your questions with your name and address to us for a response.

(Insert productivity program address)

TRAINING MANUAL
FOR
DEPARTMENTAL
LABOR AND MANAGEMENT LIAISONS

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I. Introduction

This manual presents guidelines on how to conduct productivity improvement efforts (PIEs). Its purpose is to describe the methodology and procedures required for successful PIE implementation.

PIE is the acronym for Productivity Improvement Effort. The effort is conducted within a department or division of municipal government. That part of the department or division undergoing a PIE is called a "result unit". The "result unit" is comprised of a combination of inputs such as equipment, personnel and supplies. The inputs are systematically arranged to produce outputs, i.e., a service to either the public (directly) or to another municipal agency (public-indirectly). A "result unit", therefore, is a systematically combined series of inputs and outputs which produces a service product(s) for the public.

Each department head will select from his department, or each major division, a management liaison, and the union will select the same number of labor liaisons. The departmental PIEs will be conducted by these liaisons with the aid of a departmental PIE team comprised of both labor and management employees within the department. (See Appendix for specific duties of the labor and management liaisons.) The central productivity project staff will provide the technical support necessary to effectuate a successful PIE in each County/Town department or sub-unit thereof.

Project operations rely on the joint labor-management approach, and a PIE is considered successful only if both have participated in the study, analysis, and implementation of change in the unit in which they work. This participation should result in a willingness to adopt recommendations for change which are designed to improve the operations of the unit. Also, this method of operation provides a structure for labor and management to continue to expand upon their initial productivity improvement efforts.

II. PIE Selection

Once the labor and management liaisons have attended a training workshop, they will be asked to meet at their respective work sites to develop a proposal for a result unit within their department or division based on the guidelines outlined below and the recommendations of the department head. The department head will recommend to the labor and management liaisons a service function or list of service functions within the department or division which he thinks would qualify as result units. The labor and management liaisons will jointly select a result unit, with the approval of the department head. Selection of the result unit should be based on the characteristics expressed in the following PIE guidelines:

A. The Attitude of the Employees and Management

1. Would the employees in the result unit cooperate?
2. Would the management personnel cooperate?
3. Are there any serious problems or "soon to be made" changes in the area which might make studying the result unit unfeasible at this time?
4. Would the employees benefit from a study in this unit?
5. Would management benefit from a study in this unit?

B. Measurement

1. Can you identify a work function in the unit that might be improved through a change in the current method of operations?
 - a. Can this work function be measured in terms of input (resources) and output (results)?
 - b. Is data already being collected on the input-output ratio of this function?
2. Is this a unit where recommendations for changes could be put into effect?

C. Impact of PIE

1. Is this a crucial high-growth-rate unit in the department?
2. Would the improved service of this unit have a substantial effect on the total department?
3. Could a PIE in this result unit be beneficial to the municipality?

D. Manpower

Are there employees within the unit who already have skills necessary to conduct a PIE, or who could be trained to help conduct the PIE?

E. Speed

Could a PIE be conducted within a reasonable amount of time? (four - six months)

III. Development of a PIE Proposal

After the result unit has been selected and approved, a PIE Proposal should be written. This proposal should be no more than six double-spaced typewritten pages.

The following is a PIE Proposal Outline:

(See Appendix for a Sample PIE Proposal).

A. Background Information

1. State department title and division titles therein
2. State the number of employees in each division.
3. State the title and function of the division selected as your recommended result unit.
4. Describe the type of work load and staffing available in the result unit.

B. System

Identify in order and outline form, the work flow within the result unit. For example: How leaf removal is performed; how consumer protection bills are processed; how complaints are handled by a department, etc. (See Section VII for further explanation of inputs and outputs.)

C. Observations

List the reasons for selecting this unit as your PIE. Include any problem areas, duplication of work or delays observed under the current system.

D. Measurement and Data Collection

1. List sources of available data such as records from logs or schedule books.
2. If possible, select specific units of measurement necessary for your study from among the available sources of data.
3. If no data is available for specific functions or areas of interest, emphasize this in your PIE Proposal, and attempt to develop a system capable of generating pertinent data in a timely and accurate fashion.

E. Productivity Improvement Plan (PIP)

A PIP is the proposed plan of action to be taken in the result unit, or a description of those changes which must occur to achieve productivity improvement. However, since it is essential to establish a specific productivity measurement before a final PIP is developed, the productivity improvement plan in the PIE Proposal is only a statement of the tentative changes envisioned within the system.

IV. PIE Approval

Once the PIE Proposal has been written, it should receive the approval of the department head. After it receives department head approval, it should be sent to the productivity program for review. A meeting will be arranged between the assigned PIE Advisor and the departmental liaisons to discuss the Proposal in terms of its feasibility. After this meeting, the PIE Proposal will be sent to the Proposal Review Committee (PRC) and the Labor and Management Policy Team (LMPT) for approval. Once a Proposal has been approved by these two groups, the departmental liaisons will meet with their PIE Advisor to discuss the preparation of a final productivity improvement plan.

V. Development of a Departmental PIE Team

Since the department itself carries the responsibility for conducting the PIE in the chosen unit, it must allocate personnel to carry out the work.

- A. The labor and management liaisons, with the assistance and approval of the department head, will be responsible for selecting other departmental personnel capable of working on the development of a PIE.
- B. The liaisons, with the aid of the productivity staff, will also be responsible for educating the departmental PIE team members on the concept of productivity and the benefits of the program.
- C. The departmental PIE team will establish a time schedule, with the approval of the department head, to allot time for the team to work on the PIE.
- D. The PIE Advisor will aid the departmental PIE team when necessary in conducting the study, including development of measurements and instructions on how to conduct the implementation step most effectively.

VI. Background Information

A. The Budget

A review of the department's budget is necessary to evaluate the PIE, in order to determine whether a productivity improvement will result in a financial savings for the department.

B. Organizational Chart

Each PIE Proposal should include an organizational chart to illustrate the lines of authority within the department and the result unit. The chart should include a notation of all unfilled positions.

The chart will be analyzed later in terms of changes which take place as a result of the study, such as any increase or decrease in staff, transfer of staff, or change in assignment of duties of any employee.

C. Annual Reports

The liaisons should thoroughly review the annual reports of the department over the past few years, to determine whether the PIE furthers the stated goals of the department.

D. Personnel Data

Personnel data should be collected both for use in developing manpower goals, and in assessing the duties performed by employees before and after the PIE. Liaisons should collect data on:

1. the number of employees in the result unit
2. the official title of each employee
3. the assignment of employees to duties other than those described by their titles.

VII. Baseline Data

The PIE Proposal has already outlined how the system operates, as well as the inputs and outputs of the system. The collection of baseline data means obtaining an account of the inputs and outputs in terms of real numbers.

A. Examples of Baseline Data

1. Typing Pool

- a. the number of different categories of work or the number of pages of material entering the typing pool
- b. the number of typists and supervisors in the pool
- c. an inventory of typewriters and other equipment used by the pool
- d. the number of typed pages produced by the pool daily, weekly, or monthly

2. Vehicle Maintenance

- a. percentage of vehicles out of service
- b. number of hours required to perform different maintenance tasks.
- c. maintenance delay time as a result of waiting for parts

3. Medical Service

- a. "throughput" time for patients
- b. waiting time for special service (i.e., lab or x-ray)
- c. relation of staffing pattern to patient demand (deployment)

B. Productivity Measures

The liaisons must also determine possible measures of productivity for the system, i.e., 1) number of type-written pages produced by a typing pool per day, 2) percentage of vehicles out of service and for how long a time period, or 3) "throughput" time for patients.

Once the liaisons have determined the availability and reliability of data, they must then develop possible measures of productivity. If a measure of productivity is decided upon for which there is no existing data base, then the liaisons must develop a reliable and efficient method for collecting the necessary new data. Although the creation of a data base may impede the progress of the study, it is essential for a solid data foundation to be established in order to insure a reliable measure of productivity change.

C. Seasonal Variations

Reliability of data collection also depends upon whether the unit under study experiences seasonal trends in its work load. For example, if requests for medical service peak during the summer months and remain constant during the remainder of the year, it indicates that an analysis of the system during the summer will not be a reliable measure of the unit's productivity. The important point is correlation: like units, similar groups, similar equipment usage, similar time periods, etc. must be measured. If initial measurements are made during a "peak period", then it is essential that remeasurements occur during a "peak period".

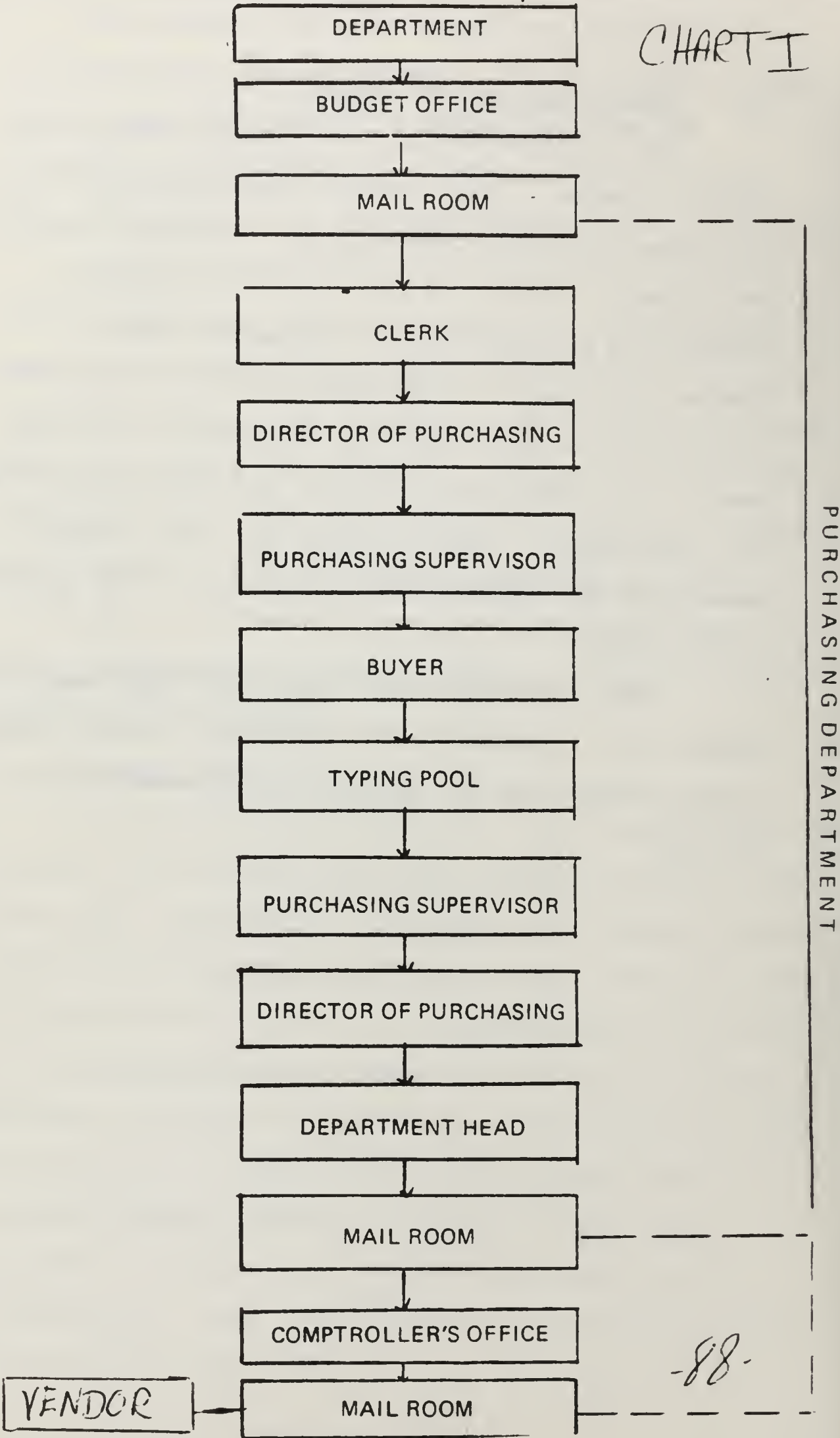
VIII. Observation of the System

The liaisons should track inputs through the system in order to gain a better understanding of how the system operates, particularly the delay points in the system. A flow chart will aid the liaisons in visualizing the work flow of the system (Chart I - Sample Flow Chart). Employees in the unit should be interviewed to gain firsthand knowledge of the work they do, any problems they face, and their suggestions for improvement. The interviews are also helpful in developing the interest and commitment of the employees in the unit.

Once observation and interviews have been completed, the liaisons should record the results, emphasizing suggestions for possible improvements in the system.

FLOW CHART OF A REQUISITION IN PURCHASING DEPARTMENT

CHART I



IX. Collection and Analysis of Measurement Data

The departmental team is now ready to collect the baseline data outlined in Step VII. The PIE Advisor will aid the team in developing any forms or systems necessary to collect the data and in analyzing the data.

Once the baseline data has been analyzed, the team is ready to compare the data to their observation report (Step VIII) and develop their recommendations for change (PIP).

X. Final Approval of the PIP

The labor and management liaisons will be responsible for presenting a formal productivity improvement plan to the department head for approval. The PIP should include recommendations for all changes which must occur to increase productivity. Baseline data results should be used to support the recommendations for change. The PIP should also specify what productivity measurement will be used to document a productivity increase (sample PIP is appended).

XI. Personnel Briefed on Systems Change

The departmental PIE team will be responsible for meeting with the employees in the result unit to explain the PIP. The explanation should include: 1) the goals the team hopes to achieve through the changes; 2) the impact of the changes on the employees in the unit; 3) the data on which the changes are based; and 4) the service unit measurement by which success in achieving goals will be evaluated.

If training or retraining is necessary within the unit for the PIP to be implemented, this must be accomplished by the department before changes are introduced. If necessary, the PIE Advisor will aid the department in finding outside training assistance.

XII. PIP Introduced

The departmental team will be responsible for introducing the changes into the system and monitoring the system during the test period. The monitoring is used to observe any problems created by the changes. Continuous feedback sessions to inform the employees of the status of the PIE should be conducted. These sessions will give the employees a way to evaluate their own unit's performance.

XIII. Remeasurement Phase

Once the test period is over, the team is ready to remeasure the system to determine whether a productivity improvement has been achieved.

The PIE Advisor will aid the departmental team in evaluating the success of the PIE by using the following data:

- 1) measurement data analysis (before and after)
- 2) budgetary information
- 3) possible changes in the duties of employees
as outlined in a revised organizational chart
- 4) observation report by the departmental team.

XIV. Final Report

The information collected throughout the conduction of the PIE will be used by the liaisons to develop a full report on the PIE. The report should include an explanation of the action taken during each of the steps described, and conclude with an evaluation of the effect of the systems change on the unit and on the department. This report should be submitted to the department head and then to the productivity program. In addition, a feedback session should be held with the result unit employees in order to acquaint them with the final results of the PIE.

APPENDIX I

GLOSSARY OF PRODUCTIVITY TERMS

PIE Productivity Improvement Effort

PIE is the acronym for Productivity Improvement Effort. The effort is conducted within a department or division of municipal government. That part of the department or division undergoing a PIE is called a "result unit".

RESULT UNIT

The result unit is comprised of a combination of inputs such as equipment, personnel and supplies. The inputs are systematically arranged to produce outputs, i.e., a service to either the public (directly) or to another municipal agency (public-indirectly). A result unit therefore, is a systematically combined series of inputs and outputs which produces a service to the public.

PIE PROPOSAL

A PIE Proposal is a document which outlines:
1) the background of the unit, 2) the operation of the unit, 3) the selection and availability of measurement data, and 4) a tentative plan to improve the productivity of the unit (PIP).

PIP Productivity Improvement Plan

A PIP is a proposed plan of action to be taken in a PIE. It is composed of those changes which must occur in order to achieve a productivity improvement. (It is essential to have established a specific productivity measurement before a final PIP is developed.)

PRC Proposal Review Committee

The proposal review committee consists of members of the productivity program, including the director, staff analysts, and consultants, who meet to review, analyze and approve all PIE Proposals.

INPUT

The resources utilized by a department or "result unit" to produce an output. Example: equipment, personnel and supplies.

OUTPUT

The results obtained from the utilization of inputs, e.g., either a service to the public (direct) or to another municipal agency (public-indirect).

LABOR-MANAGEMENT POLICY TEAM (LMPT)

The LMPT is the policy making body for the productivity program. It is composed of union and management representatives selected for their interest in productivity improvement.

PIE ADVISOR

The PIE Advisor is a consultant from the central project staff who is responsible for helping the departmental liaisons develop a PIE Proposal and carry out a plan to actually improve productivity within the selected unit.

APPENDIX II

Responsibilities of the Labor and Management Liaisons

The specific responsibilities of the labor and management liaisons can be summarized as follows:

1. Attend a workshop conducted by the productivity program. This workshop will outline the productivity program and the liaisons' role, and will also explain the methodology used in conducting a PIE.
2. Return to department and meet with the department head to discuss possible result units (PIEs) in the department.
3. Discuss and analyze possible result units using PIE Guidelines (included in Step II of Training Manual).
4. Select a result unit. Write a PIE Proposal based on PIE Proposal Outline (included in Step III of the Training Manual). Submit PIE Proposal to department head for approval, then to productivity program.
5. Aid in selection of departmental labor and management team to help in conducting the PIE.
6. Attend a second seminar on PIE data collection and analysis.
7. Obtain pertinent background information on the unit under study.
8. Establish appropriate measurements for the PIE.
9. Observe the system and interview employees.
10. Collect and analyze baseline measurement data.
11. Develop a formal PIP to be approved by the department head and the productivity program PIE Advisor.
12. Brief employees in result unit on changes.
13. Introduce systems change and monitor the new system.
14. Remeasure the productivity of the system.
15. Feedback to employees on results of the remeasurement.
16. Prepare final report evaluating the success of the PIE, to be submitted to the department head and the productivity program.

APPENDIX III

SAMPLE PIE PROPOSAL

THIS IS A HYPOTHETICAL EXAMPLE AND DOES NOT REFER TO AN ACTUAL DEPARTMENT.

A. Background Information

The Department of Consumer Affairs in East Oshkosh, Idaho is responsible for protecting consumer interest. The department has three functions: legislation, inspection, and enforcement. There are a total of 485 employees: 85 in legislation, 150 in inspection, and 250 in enforcement.

The department and the union have agreed to work with the Legislative Division which is responsible for preparing Consumer Protection bills and getting them passed. The Legislative Division has 36 legislative officers responsible for drafting legislation, 6 supervisors, 8 administrators, and a clerical staff of 35 typists and stenographers. The work load of this division has increased considerably this year due to the additional need for consumer protection legislation and the increased interest on the part of the public. The staff increase of 25% has not kept pace with work load increases of 50%.

The legislative clerical staff of 35 is divided into three sections: typing pool, steno pool, and steno staff. The typing pool and steno pool are directed by an administrative manager. The typing pool has one supervisor and 24 typists and the

steno pool has floating stenographers assigned to do research and correspondence work. The steno staff has eight stenos who are secretaries to individual administrators for the legislative officers.

B. System

1. A consumer Protection Bill is drafted by a legislative officer and submitted in handwritten form.
2. It is sent to the typing pool to be typed in draft.
3. Bills are assigned to typists by the typing pool supervisor.
4. The draft is returned to the legislative officer for review, and is then circulated among the staff for comments and the administrator for approval.
5. The legislative officer rewrites the bill in final form.
6. The bill is typed on mats by the typing pool. The Bill is mimeographed, envelopes typed and stuffed for mailing.
7. The legislative officer writes any amendments necessary as a result of work with legislators and consumer groups.
8. The typing pool types final mats. The bill including amendments is mimeographed, and envelopes are typed and stuffed for mailing.

C. Observations - Clerical Staff

1. Typing Pool
 - a. Typists have difficulty reading legislative officers' handwriting; this delays typing.
 - b. There are backlogs in the typing pool.
 - c. The bills must be mimeographed and mailed in typed envelopes to consumers and legislators; this is a long tedious process.
 - d. There is no specialization in the typing pool.

2. Stenographic Pool

- a. Eight secretaries are assigned, one to each administrator.
- b. They report to the administrator and do work for no one else.

D. Measurement and Data Available

The typing pool types 320 bills and 980 amendments a year. Each bill averages 200 pages and each amendment averages 15 pages. There is a backlog of 400 - 600 pages. There is a log kept by the typing pool supervisor which tells when the bill or amendment is brought into the typing pool and when it is completed. In addition, there is a chart kept on how many pages each typist is responsible for, plus a mimeo schedule. A schedule for typing envelopes and stuffing them, which is done on a rotating basis, is also kept. Data is available from the logging and schedule books kept by the typing pool supervisor. The steno pool also has a backlog of work. There is no log kept on work being performed by the steno pool there is, however, a file of all correspondence. The file shows the correspondence work load of the eight secretaries in the steno pool.

E. PIP Plan

The ever-growing backlog in the typing and steno pool has caused increasing delays in processing the Consumer Protection Bills. We hope to design a Productivity Improvement Plan (PIP) which will make the processing operation more efficient by reducing the delays in the clerical system.

APPENDIX IV

SAMPLE PRODUCTIVITY IMPROVEMENT PLAN (PIP)

THIS IS A HYPOTHETICAL EXAMPLE AND DOES NOT REFER TO AN ACTUAL DEPARTMENT.

A. Analysis and Observation

The Consumer Affairs Department, Legislative Division's clerical staff was selected as the result unit. The clerical staff consists of 35 people divided into three sections: typing pool, steno pool, and steno staff. The major activity of the typing pool is the typing of bills and amendments drafted by the legislative officers.

The Legislative Division's clerical staff was selected as the result unit after interviewing all the employees in the Legislative Division and examining the record keeping of the various units. The clerical staff had the most accurate record keeping and was found to have a constant work backlog.

B. Basic Data

The clerical staff is required to type 175,000 pages a year for bills, amendments and other miscellaneous types of work. Due to the nature of the typing it is essential that one typist handle a bill from start to finish. The copying and mailing of bills and amendments, however, can be handled by anyone in the typing pool. The records show that with correction, copying and mailing, it takes an average of 45 days for a bill to be completed by the clerical staff. The typists state that about 15 of those days are spent with corrections and revisions. Most of the corrections

which are made are a result of the typists being unable to read the legislative officer's handwriting.

C. Goal and Changes Intended

The goal of the productivity improvement effort in this unit is to reduce the existing backlog and to allow for the same staff to handle an increasing work load.

The productivity of this result unit would be increased by the installation of a Word Processing System. The Word Processing System would eliminate the problem of reading handwritten reports, since it includes dictating equipment, and would allow for additions and deletions to be made to documents without having them completely retyped. The repetitive nature of the typing pools work makes the introduction of this new equipment feasible and desirable.

D. Measure

The measurements used will be the same as were used for the baseline measure: total number of days taken to process bills and amendments, number of pages typed per week per typist, and backlog of untyped pages. The word processing equipment will enable the clerical unit to clear up the backlog and reduce the time spent on processing bills and amendments.

The team feels that although the equipment means a capital investment, the savings in man-hours will pay for the capital investment. The following is an account of how the anticipated savings will be generated.

E. Brief Cost Analysis of Impact

The personnel savings accruing from the installation of capital equipment are fairly easy to determine. Assuming the average yearly output is 5,000 pages, then the average cost per page is \$1.74.

Further, assuming the annual rate of work load growth is measured in typed pages, then the growth rate is 10%.

From experience we know that the installation of Word Processing equipment will increase the average secretary's output by at least 150% or to approximately 12,250 pages per secretary per year. The annual operation cost of the Word Processing System (including rental of equipment) is \$40,000 per year. If the annual average 10% increase in work load remains constant (compounded) it will take over 10 years for the work load to equal the clerical unit's new capacity via Word Processing. With the new Word Processing equipment, it will take 15 secretaries ($15 \times 12,250 = 183,750$ pages) to do the work which formerly required 35 secretaries ($35 \times 5,000 = 175,000$ pages). This will leave the department with 20 extra people to be deployed to other areas in the department, or even to other departments.

Using a gross estimate, the total cost of the system over ten years assuming a compounded 10% per year cost increase for inflation would be \$637,289. But the department would have had to hire 51 additional secretaries over a 10 year period to meet the projected increase in work load, at a total cost of \$2,165,922 (without compounding salary increases).

F. Remeasurement and Final Report

Once the equipment has been installed and training has taken place the after-measure will be taken. The after-measure will have to be taken after about six months, since there is a learning curve involved in the training for the new equipment. Once an after-measure has been taken, a final report will be written verifying the results of the study. Success of the PIE will be measured by the decrease in the number of days it takes to complete a bill (this will be expressed as a percentage of the 45 days it presently takes). The expanded capacity of this department to handle an increasing work load will be a basis for continued productivity, but it is only potential until the prospective increase actually occurs.

BIBLIOGRAPHYBooksImproving Productivity and Productivity Measurement
in Local Governments

Harry P. Hatry and Donald M. Fisk

The Urban Institute U.S. Government Printing Office
1972Jurisdictional Guide To Productivity Improvement Projects:
A Handbook For Public OfficialsInternational City Management Association And
National Commission On Productivity
September 1974Measuring and Enhancing Productivity in the Federal
Government (Summary Report)Office of Management & Budget, Civil Service Commission,
General Accounting Office, Bureau of Labor Statistics
June 1973Measuring and Enhancing the Productivity of Service
and Government Organizations

Marvin E. Mundel, Ph.D.

Asian Productivity Organization

Nordica International, Ltd.

Hong Kong 1975

Measuring the Effectiveness of Basic Municipal Services
(Initial Report)

The Urban Institute

International City Management Association

Washington, D.C.

February 1974

Pay, Productivity and Collective Bargaining

Robert B. McKersie and L.C. Hunter

Great Britain: MacMillan

St. Martin's Press

1973

Survey Sampling

Leslie Kish

New York: John Wiley

1965

Theory of Psychological Measurement

E.E. Ghiselli

New York: McGraw Hill

1964

BIBLIOGRAPHY

Articles

"Now Is The Time For Productivity Bargaining"

Jerome M. Rosow

Harvard Business Review, Vol. L No. 1

January-February 1972

"The Productivity Problem And What Can Be Done About
It In The Public Sector"

Robert B. McKersie

Institute of Public Employment

New York State School of Industrial and Labor Relations

Cornell University

"Symposium On Productivity In Government"

Chester A. Newland

Public Administration Review

November-December 1972

"Theories and Principles Of Productivity Measurement
At Different Levels"

Karl Borch

Productivity Measurement Review

August 1965

"Shared Savings: One County's Proposal For Productivity
Bargaining"

Public Personnel Administration

Prentice-Hall, Inc., Vol. 13, April 15, 1975

"Nassau County Multi-Municipal Productivity Project"

Vincent J. Macri

MBO and Productivity Bargaining in the Public Sector

Public Employee Relations Library, 1974

International Personnel Management Association

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